IN THE DRAWINGS

Applicant respectfully requests approval of the proposed amendments to Figure 8. Specifically, reference numerals 34 and 36 have been added to Figure 8 to designate the at least two input groups and at least two output groups referred to in the specification as originally filed. A formal copy of Figure 8 incorporating the changes is respectfully enclosed herewith in triplicate.

REMARKS

Claims 1-8 and 21-25 are currently pending in this application. By the foregoing amendment, claims 1, 4 and 6-8 have been amended; claims 9-20 have been cancelled; and new claims 21-25 have been added.

No new matter has been added to this application by this amendment.

IN THE DRAWINGS

The drawings have been objected to for failing to include the reference numeral 17 in Figure 7 due to the language, "as shown in Figure 7," which was recited in originally filed paragraph 27 of the specification. In response, applicant has cancelled the identified language to resolve any possible inconsistency.

Applicant respectfully requests that the Examiner reconsider and withdraw the objection to the drawings.

CLAIM REJECTIONS - 35 U.S.C. §112

Claims 1-8 have been rejected as being indefinite under 35 U.S.C. §112, second paragraph. Applicant respectfully traverses this rejection as applied to the amended claims.

This rejection asserts that the term "optic fiber run" is not defined and is therefore indefinite. Applicant respectfully submits that the term "fiber run" or

"optic fiber run" is clearly defined by the originally filed specification and drawings. Specifically, Applicant respectfully directs the Examiner's attention to Figures 1, 3-5, and 8, which clearly identify the fiber optic runs using reference numerals 17 and 117. The originally filed specification is replete with references to optic fiber runs (see specification, paragraphs 24, 28, 29 and 33, for example) which clearly define the optic fiber runs as being a length of optic fiber.

Furthermore, Applicant specifically stated in originally filed paragraph 28 of the specification that the plurality of fiber runs 17 is defined by the routing of the optic fiber along the paths shown in Figures 3-5. Applicant also stated in originally filed paragraph 33 of the specification that each fiber run 117 is defined by one path of the optical fiber 60. These references are made in view of the fact that a single fiber can be routed in accordance with the invention into a plurality of "runs" by the inventive method.

In view of the above, Applicant respectfully submits that the originally filed specification and drawings clearly and repeatedly defined the terms "optic fiber run" and "fiber run". As detailed below, not only did Applicant define the terms optic fiber run, but such a term would be clearly understood by those of ordinary skill in the art.

Applicant traverses the assertion that the term "optical fiber run" is not known in the art and respectfully submits herewith copies of multiple articles that

establish that the term optical fiber run is well known by those of ordinary skill in the art and, in fact, is used in common parlance as well. A brief explanation of the pertinent portions of the attached articles follows:

1. in the second to last paragraph in the December 1, 1997 article entitled An Inspired Vision by Lighting Dimensions, the author refers to light that is sourced from both ends of a fiber optic run;

2. a print-out from the College of Oceanic and Atmospheric Sciences at Oregon State University advertises that the Ship OPS building is connected to the Internet via a fiber optic run;

3. in the second full paragraph of an article that discusses Coshocton County, the author explains that one benefit of using the disclosed boring technique is that the technique is less destructive than digging a trench the entire length of a fiber optic run;

4. in the last paragraph before the Summary section of the article Shopping for Local Telephone Service: a Tutorial posted on Telephonydesign.com, the author states that the setting up of a direct TV satellite system is much cheaper than digging a trench to install a fiber optic run;

5. in an advertisement for a fiber optic light source from L-Com Connectivity Products, a detector is shown for determining the location of fiber runs and states that the product eases the difficulty of tracing fiber optic cable runs; and

6. in paragraph 5 in the article Fiber Optic Design Guide, the selection of various fiber optic runs is discussed.

The above articles establish that the use of the term "fiber optic run" has been in use since prior to the filing of the present application. In view of the

common usage of the term among those of skill in the art and laymen, as well as the clear definition provided in Applicant's originally filed specification, Applicant submits that one of ordinary skill in the optic fiber art would find Applicant's terminology clear.

Amendments to claim 1 have been made to address the remaining Section 112 rejections of claim 1. Claim 4 was also rejected as being unclear as to whether the ribbonizing is limited to one or both of the input and output groups in claim 1. In response, claim 4 has been amended to clarify that the vertical aligning is done prior to the ribbonizing of both the input and output groups.

Claim 6 has been rejected for the reference to "computer controlled" without indicating what is controlled. In response, claim 6 has been amended to recite the arranging of n fiber runs that use a programmable controller that is an operative communication with an optic fiber dispensing head connected to a moveable positioning system.

Claim 7 has been amended to clarify the proper antecedent basis for the recited groups. Claim 8 has been amended to recite that the n fiber runs can be formed in using a wrapping post and to correct the indefiniteness noted in the Office Action. The amendment to claim 8 is supported by the originally filed specification and Figure 8.

Applicant respectfully requests that the Examiner reconsider and withdraw the Section 112 rejections.

CLAIM REJECTIONS - 35 U.S.C. §103

Claims 1-8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,204,927 ("Chin et al."). Applicant respectfully traverses this rejection as applied to the amended claims.

Referring to Figures 2 and 8, the process of the present invention is directed to producing a cross-connected matrix of optic fibers. One embodiment of the process includes providing a plurality of optic fiber paths on a fiber positioning fixture 12,112. The optical fibers 6,60 are sequentially routed by arranging the at least one optical fiber 6,60 into n fiber runs 17,117 each organized with a first end in one of at least two input groups 34 and with a second end in one of at least two output groups 36 according to a predetermined map. At least m of the n fiber runs have the first end in one of the at least two input groups. M is an integer defined by $2 \leq m \leq (n-1)$. The second end of at least one of the m of the n fiber runs being in a different one of the at least two output groups than another of the m of the n fiber runs 17,117. The first end of each of the n fiber runs in the at least two input groups are ribbonized and the second end of each of the n fiber runs in the at least

two output groups are ribbonized. Thus, the process of the present invention allows for the improved manufacturing of a cross-connected matrix of optic fibers.

To establish a prima facie case of obviousness, "the prior art reference (or references when combined) must teach or suggest all the claim limitations" (MPEP § 2142).

Claim 1 recites, inter alia, "a cross-connected matrix of optic fibers comprising: . . . arranging the at least one optic fiber into n fiber runs having at least two input groups based on a predetermined map with at least m of the fiber runs having a first end being in one of the at least two input groups . . . arranging the at least one optical fiber into at least two output groups . . . a second end of at least one of the m of the n fiber runs being in a different one of the at least two output groups then another of the m of the n fiber runs."

Chin et al. is directed to a method of making a fiber optic coupler. Referring to Figure 1 of Chin et al., the fibers 18 are aligned with semi-conductor layers 12A-12N and are arranged on one end in a fashion that is generally parallel and spaced apart. On a second end, the optical fibers 18A-18N are converged to a single location in a stacked fashion to transmit light from the semiconductor lasers 12A-12N to a fiber laser 14.

There is no disclosure, teaching or suggestion in Chin et al. of forming more than one group of fibers on either side of the fiber coupler. To form a group requires

that at least two optical fibers be gathered together. One end of the Chin et al. coupler fans out the individual fibers in a parallel fashion, thus preventing any groups whatsoever, and the other end of the Chin et al. coupler gathers all of the fibers into a single group.

Referring to Figure 10, the stacked end of the optical coupler is preferably formed using a slotted block. Referring to the Chin et al. specification, column 5, lines 4-9, the slot 66 in stacking block 62 is elongated and has a width w sufficient to receive the fiber strand therein width-wise. The slot has a height sufficient to receive at least n fibers in a stack. Applicants respectfully submit that all of the drawings and the entire specification are directed to forming an optical coupler having at most a single group on one end. Additionally, each of the independent claims of Chin et al. is directed to forming a coupler that has at most a single group on one end.

Chin et al. fail to disclose Applicant's element, recited in claim 1, of at least two input groups. As detailed above, regardless of which end of the Chin et al. optical connector is considered the input or output group, the Chin et al. coupler has at most a single group on one side. Accordingly, Chin et al. fail to disclose Applicant's claimed "at least two input groups".

Chin et al. also fail to disclose Applicant's element, recited in claim 1, of at least two output groups. As detailed above, regardless of which end of the Chin et

al. optical connector is considered the input or output group, the Chin et al. coupler has at most a single group on one side. Accordingly, Chin et al. fail to disclose Applicant's claimed "at least two output groups".

Chin et al. fail to disclose Applicant's element, recited in claim 1, of a second end of at least one of the m of the n fiber runs being in a different one of the at least two output groups than another one of the m of the n fiber runs. This portion of Applicant's claimed process results in the manufactured matrix of optical fibers being cross-connected. In contrast, Chin et al. does not disclose any cross connection whatsoever. In fact, Chin et al.'s failure to disclose using more than a single group on either end of the optical coupler prevents any cross connection.

To properly modify a reference to form a section 103 rejection:

> The proposed modification <u>cannot render the prior art unsatisfactory for its intended purpose</u>. . . . The proposed modification cannot change the principle of operation of a reference. <u>If the proposed modification or combination of the prior art would change the principle of operation of the prior art</u> invention being modified, then the teachings of the references <u>are not sufficient</u> to render the claims *prima facie obvious*.
>
> MPEP § 2143.01 (emphasis added).

Applicant respectfully submits that the proposed modification of Chin et al. to form Applicant's invention as recited in claim 1 is improper. As described above, the Chin et al. reference is directed to providing an optical coupler formed by fibers

having first and second ends. The first ends of the fibers are individually fanned out in a parallel, spaced apart manner and the second ends of the fibers are stacked to form a single group.

All of the drawings of Chin et al. are directed to the above described optical coupler. Additionally, the entire specification and each of the independent claims is directed to a coupler with the fibers on one end individually fanned out in a parallel, spaced apart manner and fibers on the second end stacked to form a single group. Chin et al. operates to allow multiple optical element transmit a signal through a single waveguide or combine to send simultaneous signals through a single waveguide.

Modifying the Chin et al. optical coupler to have at least two groups on the end opposite from the fibers that are sequentially spaced apart would result in the Chin et al. optical coupler being unsatisfactory for its intended purpose of gathering optical signals from multiple spaced apart optical elements into a single wave guide. Additionally, it would change the principle of operation of Chin et al. since Chin et al. would no longer be satisfactory for gathering optical signals to one location for transmission through a single wave guide. Accordingly, Applicant respectfully submits that the teachings of Chin et al. are not sufficient to render Applicant's claim 1 prima facie obvious.

Applicant respectfully submits that claim 1 is patentable over Chin et al. because: (1) Chin et al. fail to disclose at least two input groups; (2) Chin et al. fail to disclose at least two output groups; (3) Chin et al. fail to disclose a cross-connected matrix; (4) Chin et al. fails to disclose a cross-connected matrix of optic fibers in which a second end of at least one of the m of the n fiber runs being in a different one of the at least two output groups than another of the m of the n fiber runs; (5) the proposed modification of Chin et al. to form Applicant's invention of claim 1 is improper because the teachings of Chin et al. are insufficient to render claim 1 prima facie obvious; and (6) modifying Chin et al. to form Applicant's invention of claim 1 renders Chin et al. unsatisfactory for their intended purpose.

Claims 2-8 depend directly from claim 1 and, accordingly, are also patentable over Chin et al.

Claim 7 is further patentable over Chin et al. since Chin et al. fail to disclose Applicant's element of "arranging the first and second ends of the n fiber runs such that a number of the at least two input groups and the at least two output groups created is equal to a number of the n fiber runs in each of the at least two input groups and the at least two output groups. Chin et al. are incapable of meeting this element, since the Chin et al. coupler can have no more than a single group on either end of the coupler. Accordingly, Applicant respectfully submits that claim 7 is further patentable over Chin et al.

Claim 8 is further patentable over Chin et al. since Chin et al. fail to disclose the positioning of an optical fiber along a first length of the fiber positioning fixture while moving in a first direction; the wrapping of the optical fiber around a wrapping post; and the positioning of the optical fiber along a second length of the fiber-positioning fixture while moving in a second direction, opposite to the first direction. Claim 8 essentially requires that at least one fiber be dispensed in alternating directions along the fiber positioning fixture. In contrast, Chin et al. require that a drum be rotated in a single direction during the preparation of the Chin et al. optical coupler. Accordingly, Applicant respectfully submits that claim 8 is further patentable over Chin et al.

Applicant respectfully requests that the Examiner reconsider and withdraw this Section 103 rejection.

New claims 21-25 are patentable over Chin et al. for each of the reasons mentioned above in connection with claim 1. Applicant submits that no new matter is added to this application by claims 21-25.

If the Examiner believes that any additional matters need to be addressed to place this application in condition for allowance, the Examiner is respectfully invited to contact the undersigned, by telephone, at the Examiner's convenience.

CONCLUSION

In view of the foregoing amendment and remarks, Applicant respectfully submits that the present application, including claims 1-8 and 21-25, is in condition for allowance and a notice to that effect is respectfully solicited.

Respectfully submitted,

Kevin Tabor

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United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

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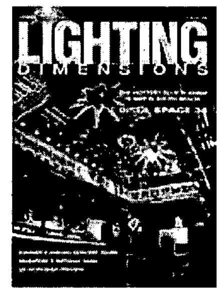
An inspired vision

Jacqueline Molloy

Lighting Dimensions, Dec 1, 1997



Australian lighting technology and design scored a huge hit recently with the lighting of the spire that proudly adorns the Victorian Arts Centre in Melbourne, Australia. The 530'-high (160m) spire, recently rebuilt due to structural fatigue, crowns the arts center which is situated on the banks of the Yarra River on a site steeped in Australian entertainment history. It housed Australia's first permanent circus back in 1877.

Recognized as one of the country's premier performing complexes, the arts center now boasts a striking nighttime attraction, as the new spire is uniquely lit up with 22,000' (6.5km) of optical fiber woven through the lattice framework to enhance the sleek shape. The new-look lighting is courtesy of the combined talents of Barry Webb & Associates (BWA) and Bytecraft P/L. In an effort to move away from the original static floodlit look, the designers came up with the concept of making the spire glow from within.

One of the major challenges was to develop an appropriate weatherproof fiber-optic illuminator, and a joint venture between two Australian companies met the challenge. Lightmoves Pty Ltd. and Digilin designed and manufactured a new fiber-optic light illuminator which has a dual rotation color wheel and internal thermal protection.

Along with the 22,000' of optical fiber, the spire is lit with 14,000 incandescent lamps on the skirt of the structure and 460' (150m) of neon tubing on the mast in addition to strobes and twinkle effects. Ten custom-designed color changers by Showcraft (each weighing 117lb) are positioned on the outer edges of the spire base, about 130' (40m) above street level and rigged onto Arena Vision metal-halide floodlights.

The issue of control presented the designers with a substantial challenge. First there was the weather to contend with; at 530' high, lightning strikes, severe winds, and extreme temperatures were a major concern. Dimming equipment is placed all over the spire and this also had to be weatherproof and capable of operating long-term without frequent maintenance.

The lighting for the spire actually consists of eight separate lighting systems, with each one independently controlled to allow for coordination and diversity of lighting states. Since the spire has a wide range of lighting fixtures, from 3W strobes to 2kW floods, it was a challenge to produce an integrated system that would cater to the complete rig. BWA in partnership with Bytecraft saw the solution as melding the technologies of theatrical and architectural lighting with high-reliability engineering.

The result is a unique distributed lighting control system which Bytecraft christened "Inspire." It has an ARC (Bytecraft's architectural lighting control system) as the head-end controller with two transmitters on each of the eight spire legs and 322 receivers distributed throughout the spire. The ARC is the central computer which runs the system using Bytecraft's "E" language (an event control language very similar to BASIC) to determine the lighting states. The ARC is also the source of the DMX512 signal that controls the system.

Since it is a long, hard climb to replace a color or change a blown lamp at 530' above street level, the maintenance of the spire lighting has been meticulously

devised. The design specification calls for five years of operation before the spire should need to be accessed for repairs and several features were incorporated into the spire design to ensure this would be the case.

Each lighting effect is generated by two illuminators, and a feature of the design is that it allows for gradual component failure over time that won't be obvious to spectators. To safeguard the effects of the fiber optics, light is sourced from both ends of the fiber optic run, and if one illuminator fails, the other can provide sufficient light to ensure continuity of the effect.

With a final cost of around AU$2.5 million (US$1.85 million) the spire lighting is truly spectacular and occasionally threatens traffic chaos as enthralled drivers catch their first glimpse. Not only is the spire lighting innovative, it is also energy efficient, drawing a mere 25kW; not much more than your average show preset.

COLLEGE OF OCEANIC & ATMOSPHERIC SCIENCES
Oregon State University

SHIPOPS NETWORK LAYOUT

The Ship Ops building is connected to the Internet via a fiber-optic run from HMSC to Ship Ops. The fiber-optic cable is connected to an FOT which connects to an HP hub. The Ship Ops network is run from this hub.

Currently, there are 6 networked PCs in Ship Ops, two of which utilize Telnet and FTP software for Internet work. All computers are daisy-chained off of one hub port.

Location

The FOT and hub are located in the phone and power closet of Ship Ops.

The following computer systems are on the Ship Ops network...

- Dave's PC, in Mar Ops office
- Linda's PC, in Mar Ops office
- ET's PC, in ET shop.
- Cpt. Palfrey's PC, in Mar Sup office
- Wayne's PC, in his office
- Ron's PC, in his office

Hardware

- Centered around an HP 28692A ThinLAN Hub Plus
- Uses standard thinnet coax with BNC connectors
- Hub centralized in E-LAB for convenient management by MTs and ETs

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See Also: [Wecoma Home Page] [Ship Network Layout] [Shipboard Computing]

Community & Technology Together

SOTA Technologies, Inc. 3COM
COSHOCTON COUNTY

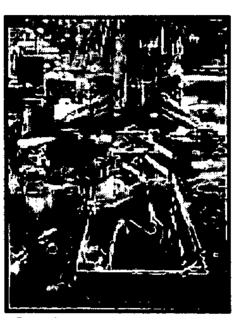
PP

PP

Coshocton County, together with SOTA Technologies and 3COM Corporation, has begun the first step in a County wide project to connect twenty County buildings together with a state of the art communication system. The communication system will allow county employees to easily communicate with each other from building to building over a wide area network by simply dialing an extension number. In the past, County employees contacted other staff members in other buildings by dialing the traditional seven digit phone number. Of course the system will supply County employees superior connections to the outside world as well. The system involves over 300 telephones with the ability to expand.

Fiber optic cables will be deployed between the Courthouse and the Sheriff's Office and between the Courthouse and the Courthouse Annex. On June 29th, Bill Hawk Inc. began the process of boring underground from the Courthouse to the Sheriff's office to provide a path for the installation of conduit to house a fiber optic connection between these two buildings. The same will done from the Courthouse to the annex. The benefit of using the boring technique is it is much less destructive than digging the entire length of the fiber optic run. Additionally, no traffic was stopped or rerouted during the process. The job will continue on the South side of the Court Square to connect the Courthouse and the Annex. The boring will take place underneath Main Street and again, traffic will be uninterrupted.

CLICK HERE TO VIEW A PHOTO ESSAY OF THE COUNTY COMMUNICATION PROJECT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Next on the agenda will be the installation of fiber optics at the County's 7th street campus. The County Services Building and the Jobs and Family Services Building will be connected by underground fiber optics installed in the same manner as the Courthouse connections. In the photograph to the left, Bill Hawk Inc. employees put their expertise to work by using state of the art equipment to bore underground to the Courthouse. They are able to guide the equipment so precisely as to reach their destination...a four foot hole...hundreds of feet away. Upon reaching the target, three inch conduit will be connected to the boring equipment and pulled back through the tunnel from which it came. An electrical wire will pulled along with the conduit so that workers in the future will be able to find the plastic conduit containing the fiber. The wire is used because fiber and plastic can't be detected with tracing equipment.

After the digging and boring is complete, all entry points are filled in and grass seed is sown. Soon there will be little evidence that any holes were dug or any heavy equipment was on the Court Square. During

the fiber installation on the Court Square, some areas of sidewalk had to be removed, local contractor Ross Brothers will replace those sections of cement directly after the work is complete.

UPDATE...9/13/01

The Coshocton County Courthouse is now home to 40 plus 3COM telephones. The County employees have been using their new telephones for a couple of weeks now. During the Courthouse installation, SOTA Technologies and County employees have been busy preparing the remaining 19 County buildings for even more Telephones. Next on the agenda is the Job and Family Services building, which is already near completion at this writing! The JFS building will need over 70 telephones to be fully operational. SOTA plans to have this entire building operational during the week of 9/17/01.

Next in line are the remaining two larger installations...the Courthouse Annex and the Sheriff's Department. After which we will move on to the remaining 16 County buildings to finish this extensive project.

Check out the picture section for recent photos of the project.

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Recent Discussion

Shopping For Local Telephone Service : A Tutorial

Since the deregulation of the telecommunications industry in 1996, shopping for local telephone service has become considerably more complicated, especially for businesses. This short tutorial explains what to look for when shopping for local service.

The Myth of Local Competition

One common myth that we encounter is that there is real competition among local telephone companies in the United States. This is sort of true, and sort of not.

If you are shopping for basic voice telephone service (POTS, or plain old telephone service), the reality is that your choices are generally limited. While you can subscribe to local phone service from other providers, they almost always rent the phone lines from the local phone monopoly or Baby Bell.

There isn't much competition for basic voice phone service, primarily because it's not a very profitable business these days, and despite the federal deregulation, most states impose stringent regulations on local telephone companies.

So, you won't find much competition for local phone lines, except for large businesses and office buildings. The real competition is to offer value added (and more profitable) services such as broadband Internet connectivity, virtual private networking, and outsourced telephone services (virtual PBXs).

Voice Telephone Service

If you're shopping for basic phone service, and for fewer than a dozen phone lines, I generally recommend that you buy this service from your local Baby Bell. The Baby Bells aren't known for being especially innovative, but they've been provisioning phone lines for a hundred years. They get the job done, and the phone lines rarely fail.

If you're provisioning service for a large business or an office building, this is a different story. You can save significant amounts of money by going to competitive local exchange carriers (CLECs). These companies typically specialize in delivering high density voice and data services to buildings in major metro areas. By cutting the Baby Bell out of the loop, you can save a lot of money while improving service. These companies typically focus on larger customers, so they are generally not an option for small businesses or residential users.

The bottom line...

- Residential users - realistically, your only options are to go to your local Baby Bell. In some cases, cable TV operators such as RCN and AT&T Broadband are offering local telephone service for residential users.
- Small businesses - small businesses have even fewer options because cable TV based phone service is aimed at residential users. Your best bet is to buy your local phone service from the Baby Bell, and then shop around for long distance, cellular and DSL service (chances are you spend more on these services anyway).

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- Larger offices and office buildings - here is where local competition has had a major effect. Most of the CLECs are focusing on large companies and office buildings. Since most CLECs are building high capacity fiber optic networks, they are looking for customers who need a lot of connectivity. Rather than install thousands of analog phone lines (at minimal profit), they would rather install a single fiber circuit that can deliver hundreds of simultaneous calls and broadband data traffic. If you need to wire a large building, you should definitely consider CLECs as well as the local Baby Bell.

Internet Connectivity

While basic voice service is a commodity subject to state and federal regulations, the market for internet service is much more competitive. This is partly because Internet connectivity can be delivered via many different technologies including: dial-up (modem), digital subscriber line (DSL), ISDN, cable TV systems, wireless (wifi, fixed wireless, cdma), and fiber optic networks. Each of these technologies is best suited to different applications.

Which technology you choose will depend primarily on your location and your budget. Your physical location will determine which technologies are available to you. DSL, for example, only works out to a distance of about three miles from the phone company's central office (switching station). If you live in a metropolitan area, chances are you will have a choice between dial up, cable TV and DSL, or at least two of the three (with dialup being the worst of the three options). Other services, such as T1, can be provisioned in most places, though they are often much more expensive than basic cable or DSL service.

When shopping for local Internet service, the first thing you need to do is figure out what options are available. Contact your local phone company and cable providers to find out whether cable or DSL service is available in your area. If cable is available, this is generally the best option for residential users (easier to install). DSL is usually a better match for offices, though installation takes longer. Prices and connect speeds are generally comparable. Expect to pay $50 to $100 per month depending on the connection speed.

NOTE: in most markets, you can buy DSL service from competing companies, and are not limited to the local Baby Bell. These companies rent circuits from the local phone companies and connect to the Internet via their own equipment. CNet (www.cnet.com) and ZDNet (www.zdnet.com) both provide search tools that enable you to research who is offering high speed service in your community. You can often save 20% or more on DSL service by going to a local ISP.

What About Wireless

In the past year or so, there has been much ado about cellular phones replacing landlines. Cellular phones are an indispensible tool, but they have their limitations. No cell phone I have used really comes close to a landline in terms of sound quality. While a cellphone is fine for a chat with a friend, if I am working, I always prefer to talk to someone on a landline, especially on a conference call. So don't throw your old telephones out just yet.

Wireless has made major inroads in Internet connectivity. In many cities, wireless technology is a very attractive solution for providing broadband Internet connectivity (and sometimes voice service) in buildings or facilities that would be too expensive to rewire for conventional connections. This technology, often referred to as fixed wireless, uses carefully positioned antennas that are placed on the roof or side of a building. The antenna

focuses on a repeater tower up to several miles away. The installation process is comparable to setting up a Direct TV satellite system (much cheaper than digging a trench to install a fiber optic run).

Summary

For most businesses, local telephone service is a commodity. The Baby Bells do a reasonable job of providing this service at decent prices. Unless you are provisioning phone service for a larger company or office building, your best bet is to buy your basic phone service from the local phone company, and then shop around for other services such as long distance, broadband internet service, enhanced services, etc.

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MICROPULSE™ Fiber Optic Light Source - Simple Location f Fiber Runs

The MICROPULSE™ Fiber Optic Light Source eases the difficulty of tracing fiber optic cable runs by using new MICROPULSE™ technology. Presently, to trace multimode terminated fiber runs, two types of equipment can be used. The first, a laser source, is expensive and dangerous to one's eyesight if viewed directly. The second method is to use an incandescent light source (flashlight) with a coupler to connect to the fiber optic termination. These devices produce a low intensity light signal, which is difficult to see by the human eye. L-com's solution to this problem was simple: Produce a low cost, high intensity light source that is safe to use and easy for the eye to locate. This was done by creating exclusive circuitry that produces an extremely bright red light source that is pulsed in an on-off manner that is easy for the eye to locate. A multi-use coupler is also utilized to support ST, SC, FC, RSD and FSD connections without additional coupling adaptors or cables.

More Ideas...

Multimode Fiber Optic Test Kit

Your Price: $1,095.00
Availability: In Stock

Fiber Optic Power Meter for Multimode and Singlemode Cabling

Your Price: $495.00
Availability: In Stock

MORE INFO

Description	MICROPULSE Fiber Optic Light Source		**Availability**	**In Stock**
L-com Item #	DXL10	**List Price**		**$59.95**
Manufacturer	L-com	**Your Price**	**1-9**	**$59.95**
			10-24	**$53.96**
			25-99	**$47.96**

MORE INFO

Description	MICROPULSE Fiber Optic Light Source Kit		**Availability**	**In Stock**
L-com Item #	DXL10K1	**List Price**		**$99.95**
Manufacturer	L-com	**Your Price**	**1-9**	**$99.95**
			10-24	**$89.96**
			25-99	**$79.96**

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Fiber Optic Design Guide

If you have checked the pricing on fiber optic cable, you know how expensive it is. If you spend a little time designing your project, you will find that you can save hundreds - even thousands of dollars!

Here are a few things to keep in mind:

1) Where you place the illuminator is very important. The closer to your project, the better. Remember, however, if you place the illuminator in a space that is not air conditioned, you may reduce the lamp life from 10,000 hours to 8,000 hours or even less. In all cases you must have **AT LEAST** 50 cubic feet of free air per minute for each illuminator. A dust free area is recommended as well. Wherever you place the illuminator, allow room to work on the illuminator. If you need more than one illuminator, don't place the illuminators close together, two feet between them is fine. Take into consideration that the illuminator can get hot!

2) **When you measure the length of cable that you will need, add 18 inches as a "service loop" to each cable run.** In many cases, it's cheaper to buy a second (or third) illuminator rather than buy enough cable to reach all corners of your project from only one illuminator. If you want a starfield that changes color and twinkles at the same time, it can be done with the purchase of a special color wheel. If you want more than 750 "stars" in your starfield, use a double port illuminator that will handle up to 1,500 strands of cable. If your project is an exterior one, the largest port available (ST150) will handle 750 strands. The 75 watt exterior unit will handle 350 strands of cable at this time.

3) It's covered in the Fiber Guide, but it's worth going over again. The perceived "brightness" of your project is a subjective one. However, there are a few guidelines. A 75 watt illuminator is fine where the ambient lighting is low, such as a garden at night or a darkened home theater. But if you want to make an impact with your project in a mall or you have very long cable runs, then you will have to use the 150 watt illuminator. And don't forget to "loop" the cable for side emitting projects - that will double your light output! Also, the size of the cable directly correlates to the amount of light that is seen at your project. Think of the cable as a water pipe and you have the right idea. Solid core cable carries more light than stranded cable but is stiffer and harder to work with. So if you have some tight curves you have to negotiate, you might stick with the stranded cable.

4) Light can bring two spaces together and make spaces look bigger. Windows can become black mirrors at night. To balance outside light levels with those inside the home, illuminate features off the patio and surrounding areas. Uplight trees and shrubs by placing the fixture close to the trunk . Fixtures placed father back from the tree or shrub can create dramatic shadows on surfaces behind the object. Use the light beam to create shadows, mark pathways, and driveways. Sconces light up walls to highlight textures.

5) When you plan your project, try to centrally locate the illuminator. Try to make the cables equal in length. If possible, keep runs to under 40 feet. If runs of over 40 feet are unavoidable, be aware that the fixtures on the shorter runs may appear brighter. To overcome this, plan on adding extra fibers on the longer run (example: for garden fixtures using 10 strands on the shorter runs, increase the cable to two runs of 10 strand or even one run of 30 strand for the longest run) You can adjust the light level by simply removing single fibers until the desired light level is achieved.

We hope this guide has helped you. Please feel free to call us if you have any questions about any of this or if something isn't covered. Thank you for coming to our site! We hope we can supply you with our fine products and be of service on this and any future projects you have.

Please see Basics of Fiber Optic Lighting for more information.
For some detailed information on installing a fiber optic system, you could read the Installation Manual for the S150 Illuminator.

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by The Contra Costa County Office of Education

Fiber Optic Run

Fiber optic runs are required when your distance between devices is more than 300 feet. In addition to the ability to span a great distance, data can also travel on fiber at great speeds. A fiber optic network will provide a solid framework for many years to come.

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